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ABSTRACT

The capacity for immediate, or almost immediate, interaction between teacher and student is often cited by distance education program developers as one of the key reasons why interactive satellite courses can be as effective as face-to-face instruction. This paper analyzes the interaction between the learner and the instructor in the distance learning context by examining three research questions: (1) How important is it to provide live broadcasts, rather than taped instruction? (2) What is the importance of the instructor providing a social presence in producing learner satisfaction? and (3) What is the importance of providing interaction between the learners and the on-screen instructor? Data was collected from two Star Schools programs, one in science called "Geonauts," produced by Northern Arizona University, and one in foreign language instruction called "Elementary German," produced by Oklahoma State University. Both deliver instruction to primary/elementary schools (grades 1-6) across the United States using interactive satellite television technology. Case Studies and mail surveys of students and teachers were used to collect data. Findings are presented in four sections, dealing with live versus taped format, interaction, social presence, and a final section examining a multivariate analysis of all of these variables. The results indicate that watching the programs live had the same effect as watching them on tape. Recommendations are made for reshaping paradigms in future distance education programs. (Contains 12 references.) (AEF)

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LIVE VS. TAPED: NEW PERSPECTIVES IN SATELLITE-BASED PROGRAMMING FOR PRIMARY GRADES

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INTRODUCTION

Education is a collaborative experience, requiring interaction between the instructor and the learner and mediation by others which serves both to facilitate the construction of knowledge and validation of the learning that has taken place. Garrison (1989) has stated that "the real power of technology is to reach out to learners and through 2-way mediated communication support their educational efforts by expediting the transformation of information into knowledge" (p. 42).

The issue of 'interaction' has been an area of much debate in the practice of distance education. Often debated questions are: What type and level of interaction is essential for effective learning? What does real-time and time-delayed interaction contribute? What type of interaction can the new interactive technologies provide? Is it worth the cost? Researchers have examined several definitions of interaction in the distance education context (Wagner 1994, Moore 1989, Hillman, Willis, & Gunawardena, 1994). Examining instructional interaction, Moore (1989) makes a distinction between three types of interaction: learner- content interaction, learner- instructor interaction, and learner- learner interaction. Hillman, Willis, and Gunawardena (1994) argue that Moore's (1989) three types of interaction do not account for all aspects of interaction in technology-mediated distance education, and point out that the addition of high technology communications

systems necessitates the conceptualization of an additional type of interaction: learner-interface interaction.

The capacity for immediate, or almost immediate, interaction between teacher and student is often cited by distance education program developers as one of the key reasons why interactive satellite courses can be as effective as face-to-face instruction. One of the key features that has impacted student satisfaction in such systems is the instructor's social presence, defined as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships..." (Short, Williams, & Christie, 1976, p. 65). Social presence means the degree to which the on-screen instructor is seen as a real person, with a genuine interest in the distance learner's progress. This characteristic is described in the literature as a function of the on-screen personality's "immediacy" or closeness in space/time and emotional "closeness."

Hackman and Walker's (1990) study provides evidence that "teacher immediacy" contributes to student satisfaction and learning in an interactive television class. Examining the concepts of "social presence" and "interactivity" Rafaeli (1990) observes that social presence is a subjective measure of the presence of others, while "interactivity" is the actual quality of a communication sequence or context. Interactivity is a quality (potential) that my be realized by some, or remain and unfulfilled option. When it is realized, and when participants notice it, there is "social presence".

THE PURPOSE OF THIS PAPER

The purpose of this paper is to analyze one type of interaction in the distance learning context, that between the learner and the instructor by examining three research questions:

1. How important is it to provide live broadcasts, rather than taped, instruction?
2. What is the importance of providing social presence in producing learner satisfaction? and

3. What is the importance of providing interaction between the learners and the on-screen instructor?

These three questions will be examined from data collected from two Star Schools programs, one in science called "Geonauts," produced by Northern Arizona University, and one in foreign language instruction called "Elementary German" produced by Oklahoma State University delivered to primary/elementary schools (grades 1 - 6) across the United States using interactive satellite television technology. The Elementary German program consisted of two programs, one designed for grades three to four, and the other for grades five to six, and data from both programs were analyzed together for this study.

Satellite based programs have a one-way video, two-way audio format, with interaction taking place via a telephone during the broadcast if receiving schools have access to a phone to call in and ask questions. For both programs, students and teachers were encouraged to interact with the TV instructor during the live broadcast by means of a toll free telephone line, and outside of broadcast times by using telephone, e-mail, fax, and regular mail. In addition to the broadcasts, both programs distributed teachers' guides containing suggested activities and worksheets to be duplicated for students use. Star Schools programs such as these funded by the U.S. Department of Education currently serve both rural and urban school districts in almost every state of the 50 states and the U.S. territories.

Based on the analysis of data related to these three questions, the ultimate goal of this paper is to propose a paradigm for designing distance learning instruction for primary/elementary grades.

DESCRIPTION OF PROGRAMS

German By Satellite (OSU)

Students in approximately 170 different high schools across the United States currently take German By Satellite courses from OSU. Many of these schools have requested that OSU develop an elementary-grade German program as a foundation for their

high-school instruction. As a result, the German By Satellite program developers developed during the first year of the grant a pilot program of instruction aimed at 4-5 grade students that meets the American Council of Teachers of Foreign Language (ACTFL) standards and proficiency goals. Subsequently, it was decided to create two elementary-level German courses instead of just one as developed for the pilot series: the two courses developed for implementation of the grant were German for grades 5/6 and German for grades 3/4.

The German courses focused on communication and structure skills, as well as culture. The cultural lessons spotlighted all of the German-speaking countries. Classroom teachers were provided with lesson plans to help them integrate the language into other courses, such as mathematics, science, and social studies. The courses meet the ACTFL standards and proficiency goals so that, by the end of the sixth grade, students should be able to:

1) interact orally on familiar topics; 2) understand predictable questions and commands in familiar topic areas; 3) copy or transcribe familiar words or phrases and produce some from memory; 4) demonstrate awareness of cultural differences, and 5) identify some important people, holidays, and geographical areas.

As with the other programs, an advisory board of professionals in the field was established to ensure a high quality of instructional design.

Geonauts for Grades 4-6 (NAU)

Geonauts for Grades 4-6, produced at Northern Arizona University (NAU), was developed from the premise that the National Parks of the United States are irreplaceable national treasures. Their remarkable beauty and diverse ecosystems represent living laboratories for understanding the fragile and dynamic interrelationships that support all life on our planet. The developers believe that increasing our awareness and appreciation of ecological systems and their interrelationships is a profoundly important goal of all educational enterprises as we approach the twenty-first century. Though many Americans

visit our national parks annually, millions have no opportunity for exposure to these remarkable resources due to a variety of socio-economic and geographic constraints.

By Fall 1993, more than twenty-five states had created some form of environmental education requirement for schools; this number is expected to increase each year. The state of Arizona, through the Environmental Education Act of 1990, had created the Comprehensive Plan for Environmental Education (January 1992) that is now being employed as a model for other states. Prominent in the comprehensive plan is the interdisciplinary nature of environmental education, and the importance of an integrated curriculum approach to environmental education. The curriculum must be built upon a solid conceptual base in mathematics and the sciences, as well as the arts and social sciences.

NAU, in collaboration with the Grand Canyon National Park Service (NPS) and the Grand Canyon Association (GCA), created the Geonauts for Grades 4-6 program with the following objectives in mind:

- Each student's demonstrated competencies in the sciences, mathematics, arts and social sciences will increase through an experiential, integrated curriculum approach employed in the program.
- Each student, especially those in traditionally underserved populations and areas, will have increased access through distance education technologies to the experiences available at national parks.
- Each student's understanding and appreciation of the interrelationships of our ecosystems will be increased, and the practical applications of these understandings to the well-being of our society and economy will be demonstrated.
- Each student will be introduced to the natural integration of the environmental sciences with the arts, literature, and social sciences, which will provide a path for life-long learning.

- Each student will have increased exposure to the careers available through the environmental sciences.

Located in Flagstaff, Arizona, NAU is 70 miles from the Grand Canyon National Park, and distinctly positioned to support this program. NAU has also established relationships with many agencies and organizations which support mathematics and environmental education. The instructional program began with Grand Canyon National Park as its setting for location video, where Ellis Richard, Chief of Interpretation, and his staff provided support and coordination for the program. The Grand Canyon Natural History Association provided free use of its considerable library of video, artwork, and other intellectual property and served as a resource to the program.

Dr. Judy Bisignano, founder of the Kino Learning Center in Tucson, Arizona, and developer of the curriculum for the formerly successful Young Astronauts program, was the principal curriculum writer for the Geonauts program. The Geonauts instructional program features a developmentally appropriate integrated design that included:

- live, interactive (by toll-free telephone call-in) satellite delivery of instruction,
- significant location video resources developed with the National Park Service and National Parks' Natural History Association,
- e-mail and fax support,
- print materials that include goals and objectives, lesson plans, student class activities, and supplemental activities, and
- continuing in-service and support activities for teachers.

Classes were delivered twice weekly for 30 minutes as part of the IDEANET programming schedule; during the 1995-96 school year, Geonauts was delivered to approximately 6740 students at 65 sites across 14 states (Alaska, Colorado, Idaho, Oregon, Washington, Arizona, Georgia, New Jersey, Tennessee, Texas, Pennsylvania, Montana, Michigan, and Florida). The Geonauts program has been designed to complement and provide articulation for ESD 101's outstanding Star/STEP program

Environmental Science, which is targeted to the secondary level. The program also provided a model for informal science education and interpretive activities at the national parks.

METHODS

In order to address the three research questions discussed above two methodologies were selected: mail surveys and case studies. Two types of mail surveys were employed; one for teachers in the classroom and one for students, both designed to solicit quantitative data using a combination of Likert scale and categorical response formats and qualitative data by means of open ended questions. For both the Geonauts and the German programs, the same questions were used to collect data on the three research questions. Data collected by the surveys fell into three categories:

1) data describing the setting in which the program was received, whether in a live interactive format or taped format, 2) data relating to the instructional process, such as interaction, and social presence, and 3) data describing the outcomes of the program, predominantly satisfaction with the learning experience. The SPSS statistical package was used to perform three types of analyses to answer the research questions: one-way analysis of variance (ANOVA), Pearson Product Moment Correlations, and logistic regression, a type of multivariate analysis.

For the Geonauts program, 4167 surveys were mailed to students in Spring 1996, and 415 surveys were completed and returned reflecting a return rate of 9.9%. In this program 353 surveys were mailed to teachers and 34 were returned indicating a return rate of 9.6%.

For the German program, 2908 student surveys were mailed and 546 students returned completed surveys reflecting a return rate of 18.8%. For this program, a total of 138 instruments were distributed to teachers and 39 responded to the survey reflecting a return rate of 28.3%. Low return rates are a frequent problem with the evaluation of large scale programs such as the Star Schools, and this is partly because accurate data on schools

that actively participate in the programs are not available. In some instances surveys were mailed to schools that were no longer participating in the programs.

Case studies employing qualitative data collection methods such as face-to-face interviews, focus group interviews and observation of classes watching the satellite delivered instruction were used to gather information related to the research questions during site visits to schools. Interview protocols were developed for principals, teachers, students, media specialists and parents. Data gathered from these instruments were reviewed for patterns of responses or phenomena, a classification and coding system was developed according to the patterns observed, and data was analyzed according to the classification scheme which emerged. The qualitative analysis was reviewed by two or more evaluation team members, those who conducted the site visits and those who did not, which allowed for the triangulation of data and member checks. For the Geonauts program, site visits were conducted at seven schools in six locations, and for the German program, site visits were conducted at seven schools in five towns across the United States between January and May 1996.

REVIEW OF THE LITERATURE

In a survey conducted by Barker and Platten (1988), students reported that limited interaction with the instructor and students at other sites was the biggest weakness of instructional television utilized to teach college level courses. Students participating in courses produced by the Midlands Consortium Star Schools Project (1991) were asked to evaluate three aspects of interaction commonly found to be problematic in distance learning. While these students generally were not satisfied with the interaction provided, students who viewed the programs on tape and had less interaction with the TV instructor than those who watched live still did as well in terms of grades and test scores. Therefore, while limited opportunities for interaction led to differences in perceived satisfaction with the distance learning experience, it did not in this instance affect student achievement (Midlands Consortium Star Schools Project Final Report, 1991.)

In their study of 123 K-6 (grades one to six) teachers participating in an interactive television course, Fulford and Zhang (1993) found that perceptions of interaction contributed to satisfaction as much as -- if not more than -- actual interaction. Their results showed that the critical predictor of satisfaction was the perception of overall interaction. This indicates that vicarious interaction within the class as a whole contributed more to satisfaction than the actual interaction of a participant with the TV instructor.

In a qualitative research study that tried to answer the question "What makes a difference in televised instruction," both learner-learner and learner-instructor interaction were identified as important components for effective learning (Sebastian, 1991). Participants in this study described the interactions that took place in the context of learning groups (i.e., learner-learner interaction) as very important.

Yi and Majima (1993) found in their study of a satellite foreign language program for high school students, that one of these factors alone, the on-site or classroom facilitator, could attenuate the importance of a number of other factors. The successful functioning of the classroom facilitator as the mediator between the remote teacher and the learners can create a dynamic learning environment even when direct interaction between the students and the TV instructor is limited to once every two months.

ANALYSIS AND DISCUSSION OF RESULTS

The analysis of the Geonauts and German programs examined whether there was a relationship between:

1) the method used to view the program, live broadcast vs. taped format and student and teacher satisfaction with the program,

2) live interaction during the program and student and teacher satisfaction with the program,

3) instructor social presence and student satisfaction with the program.

The findings are presented in four sections; three dealing with each of the above areas, and a final section examining a multivariate analysis of all these variables.

Live vs. Taped Format

Most of the schools watched the Geonauts and German programs that were broadcast live in a taped format. For example, in the German program 82% of teachers and students who responded to the survey indicated that they watched the program in a taped format. A one way analysis of variance (ANOVA) was conducted to determine if there was a difference in student satisfaction with the program when it was viewed live rather than taped. No significant difference was observed in the satisfaction of German students when the program was watched live rather than taped. However, a significant difference was observed in the satisfaction of Geonauts students indicating that those who watched the Geonauts program on videotape were more satisfied with the program than those who watched it live ($F = 5.4$, $DF = 1, 385$, $p = .02$). This analysis indicates that for German students there was no difference in satisfaction with the program if the program was watched live or taped. On the other hand, students taking the Geonauts program were more satisfied watching the program in a taped format than when it was broadcast live.

The same pattern was observed in the analysis of the satisfaction level of teachers who assisted in class during the Geonauts and German programs. There was no significant difference in whether the programs were watched live or taped.

Qualitative data obtained from case studies indicated that teachers preferred watching the program on tape because it gave them more control over the lesson. They could repeat a section of videotape when something was missed or stop the tape to make a point. Also, the tapes could be played at a more convenient time than when it was broadcast live.

Interaction

To examine the importance of providing interaction between learners and the on-screen instructor several different analyses were done. A one-way analysis of variance (ANOVA) was conducted to determine if there was any difference in student satisfaction with the programs and interaction with the TV instructor during the program. No

significant difference was observed in student satisfaction for either Geonauts or German. A second one-way analysis of variance (ANOVA) was conducted to determine if there was any difference in student satisfaction with the programs and interaction with the TV instructor outside of broadcast times. No significant difference was observed in student satisfaction for either program.

A one-way analysis of variance (ANOVA) showed a significant difference in teacher satisfaction when the class could call in and talk to the TV instructor during the TV class in the Geonauts program, indicating that Geonauts teachers whose classes could call in and talk to the TV teacher during the TV class were more satisfied overall with the Geonauts program ($F = 6.22$, $df = 1, 32$, $p = .0179$).

For both Geonauts and German two separate one-way analysis of variance (ANOVA) indicated a significant difference in overall teacher satisfaction when the class could call in and talk to the TV teacher outside of broadcast times. Teachers, whose classes could call in and talk to the TV teacher outside of broadcast times were more satisfied with their respective programs; Geonauts ($F = 12.34$, df 1, 29, $p = .0015$) and German ($F = 7.83$, $df = 1, 32$, $p = .0086$).

In summary, interaction during the broadcast or outside of broadcast times did not make a significant difference in student satisfaction with either the German or Geonauts programs. However, the ability to interact with the TV teacher during the program did show a significant difference in the satisfaction of Geonauts teachers. Geonauts teachers whose classes could call in and talk to the TV teacher during the TV class were more satisfied overall with the program. A significant difference was also observed in the satisfaction level of teachers in both Geonauts and German that indicated that teachers were more satisfied when they could call the TV instructor after broadcast hours.

Social Presence

Students' perceptions of social presence, which includes elements such as the teacher's humanizing qualities and instructional style were measured by four items. The

questions concerned issues such as how involved in the program the TV teacher made them feel, and whether they liked the TV teacher. In order to determine the relationship between social presence and student satisfaction with the program, a Person-Product Moment Correlation Coefficient was used. The correlation between social presence and German students satisfaction with the program was fairly high ($r = .72$, $p = .000$), and the correlation between social presence and Geonauts students satisfaction with the program was moderate ($r = .55$, $p = .000$). These finding show a moderate to high relationship between the social presence of the TV instructor and overall student satisfaction in the German and Geonauts programs.

Multivariate Analysis

In order to develop a comprehensive model to examine the relationship between live vs. taped viewing of the program, and the variables: interaction, social presence, and satisfaction with the program, a logistic regression analysis was computed. In logistic regression, one is able to estimate the probability of an event occurring; in this case, the probability that social presence or interaction is related to satisfaction in either the live or taped format. In this logistic regression model the variable live vs. taped was held constant.

For Geonauts students the results were able to correctly classify cases with 70% accuracy (Goodness of Fit Chi Square 34.65, df 2, $p = .000$) using a forced entry method. The Wald statistic indicates that both interaction and social presence are significant in predicting satisfaction when method (live vs. taped) is held constant. See Table 1.

Table 1

Variables in the Logistic Regression Equation for Geonauts Students

Variable	B	S.E.	Wald	df	Sig	R	Exp (B)
Interaction	.5702	.2404	5.6251	1	.0177	.1486	1.7685
Social Presence	1.6467	.3348	24.1879	1	.0000	.3676	5.1899
Constant	-5.7828	1.5284	14.3156	1	.0002		

For Elementary German students the logistic regression analysis was able to correctly classify cases with 75% accuracy (Goodness of Fit Chi Square 58.36, df 2, p = .0000). For German students social presence was a stronger predictor of satisfaction than interaction. See Table 2.

Table 2

Variables in the Logistic Regression Equation for Elementary German Students

Variable	B	S.E.	Wald	df	Sig	R	Exp (B)
Interaction	.2137	.1904	1.2589	1	.2619	.0000	1.2382
Social Presence	2.2331	.4176	28.6013	1	.0000	.3332	9.3291
Constant	-6.5355	1.2468	27.4781	1	.0000		

These analyses confirm that for both Geonauts and German students, social presence was a strong predictor of satisfaction. In addition, for Geonauts students, interaction was also an important and significant predictor of satisfaction. These logistic regression analyses were used to correct for possible multicollinearity.

The logistic regression results indicate that for both German and Geonauts students, satisfaction with the program could be predicted by social presence and interaction. However, the relationship between social presence, interaction, and satisfaction with the program was not found to be dependent on whether the programs were viewed live or taped. The results indicate that watching the programs live had the same effect as watching them on tape.

REFRAMING THE PARADIGM: RECOMMENDATIONS FOR FUTURE DISTANCE PROGRAMS

The results revealed two striking facts: first, that in most classrooms distance education programs are being used taped rather than as live broadcasts, and second, that there was no correlation between students' reports of their satisfaction with the learning experience and whether or not the students were able to interact live during the broadcast with the on-screen instructor. Those students who watched the program on tape were as satisfied with the program as those who watched it live. Based on these findings, and on related observations during the case study phase of the evaluation, the authors suggest that a reframing of the basic concept of distance education is appropriate when distance courses are delivered on a large scale to students in formal classrooms. An appropriate metaphor for the approach the authors suggest is "team teaching," with the on-screen instructor in the distance course acting as a partner to the teacher in the classroom. An important corollary to this reframing is that live interaction during broadcast times should be de-emphasized in favor of three-way interaction among students, the classroom teacher, and the on-screen instructor. Moreover, the importance and effectiveness of asynchronous means in maintaining contact between students and the on-screen instructor, by using mail, e-mail, fax, etc. should be recognized.

The "team teaching" approach the authors envision is obviously different from the approach prevalent in the distance education of adults, which focuses upon the direct relationship between the on-screen instructor and students who happen to be separated from him or her by distance and/or time. Examination of the different circumstances which

apply in the elementary (primary) classroom, however, support the authors' contention that in this setting a different approach is needed.

The first difference implying the need for a different paradigm in distance education at the primary level is the obvious difference in the maturity level of the learners. Eager as children may be to learn, they are still children, and it is probably unrealistic to expect that large groups of children will commit themselves to a distance learning program with the same determination and self-discipline which adults might bring to the endeavor. It is therefore obvious that adult supervision will be required during the periods in which children are working with distance learning programs. In every case examined by the authors in their year-long study, the adult present in the classroom during the distance program was a degreed professional, and in more than 99% of cases, that adult was a licensed (or "certified") primary school teacher.

This represents a second difference between the circumstances of adult and primary education: the degree of expertise characteristic of the facilitator at the distance learning site. In the adult distance learning context, the on-site facilitator or coordinator may be little more than a technician capable of operating the technology by which instruction is mediated. There may even be no one at the distance site other than the learner. By contrast, in the elementary school setting, the person present is a skilled professional with a very active role to play in the learners' overall development. While these teachers may not be expert in the subject matter of a distance course (e.g., the German language) they are at least highly knowledgeable about the children in their care, who often include some children facing special challenges in learning. In short, these on-site facilitators are professionals who deserve to be recognized as full partners by the distance education faculty they work with.

Not only are professional teachers present with the students as they work with distance programs, but it is likely to be the teacher who decides how and how much of the program is used. The authors found that the degree of reliance of the classroom teacher upon the distance program materials was in roughly inverse proportion to the teacher's

knowledge of the subject and experience of teaching it. We may represent this imaginatively by the following graph:

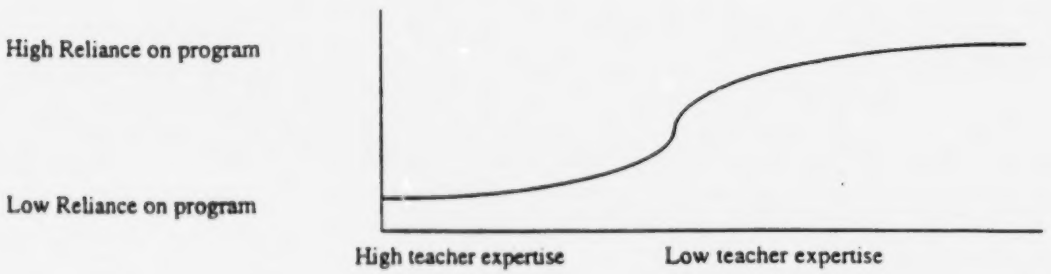

Figure 1
Projected Classroom Teacher Reliance on Distance Program Materials
Related to Teacher Expertise

For example, the program presented instruction in earth science; teachers who had strong backgrounds in science were observed to use the program as a resource to add enrichment and variety to instruction of which they themselves carried the primary burden. The experienced or science-expert teachers designed instruction for their class and used the Geonauts material to meet their own instructional objectives. By contrast, those teachers who did not have a strong preparation in science tended to use the program more as the primary mode of instruction. These non-experts also reported studying the content and teaching techniques used in the program, with an eye to improving their own science teaching skills. Here the analogy to team teaching is evident; two (or more) teachers work together and the teacher with more knowledge or experience in a content area takes the lead in that area, while the other assists students and stands ready to take the lead in another content area afterward. The only feature of this scenario unique to distance learning is that one of the team members -- the distance instructor -- is not physically present in the classroom. The authors suggest that in future, distance course design for large-scale delivery to primary classrooms must include planning for the role of the classroom teacher

as a more- or less- active partner in the learning enterprise, with both the TV teacher and classroom teacher facilitating the learning of the content as represented in Figure 2.

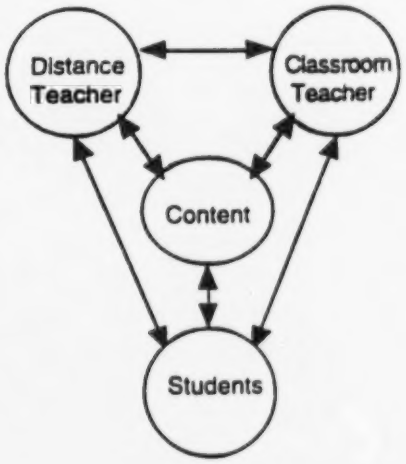

Figure 2: Paradigm for Designing Satellite Instruction for Primary Grades

The Elementary German by Satellite program provides an example of one practice absolutely essential to the success of such efforts: that practice is maintaining open lines of communication between the on-screen instructor and classroom teachers. The on-screen instructors in this program actively solicited feedback from classroom teachers and acted upon the feedback they received in improving the program. Moreover, they created a strong (and accurate) impression of being approachable and willing to help the classroom teachers with difficulties or special requests, such as the words to a favorite song in German.

Once the relationship between on-screen and classroom teachers is redefined, certain limitations of mass delivery can be overcome. For example, the Geonauts program was delivered to several thousand children. It would clearly be impossible to respond to questions from even a small percentage of these students during the broadcasts, even if the

entire length of every broadcast were devoted to questions. Viewing the classroom teacher as a partner in instruction means that no student's question need go unanswered, even if a minimum of broadcast time is devoted to questions. Moreover, a "multiplier" effect is obtained by including the classroom teacher in the course design: for example, when the classroom teacher works with the distance program in conducting a hands-on activity, not only is the learning of that group of students reinforced, but the classroom teacher may learn a teaching technique which will benefit students in many subsequent classes. Thus, the inability of a distance teacher to supervise student activities directly -- a seeming limitation -- actually becomes a potential benefit.

There are benefits, as well, to be observed in the use of asynchronous means of communication between students or classes and the on-screen instructor. The authors observed that in practice, students in the German and Geonauts classes tended to communicate with the on-screen instructor by sending in special projects, such as posters designed by the students or tapes of the students singing a German song. Such student contributions, particularly in the German program, very often received on-screen recognition, which invariably thrilled the students. This recognition seems to have been particularly potent because the students saw the on-screen instructor as being a sort of media "star." Teachers interviewed during the case-study phase of the evaluation invariably reported that this motivated the students to put forth their best efforts and to think of further ways they could gain on-air recognition.

There is room, in distance education, for as many successful paradigms as there are different learner needs and circumstances. However, we must continue to bear in mind that the paradigm successful for one kind of learner may not be appropriate to another. For K-12 learners, the most appropriate paradigm is likely to be that which takes the most appropriate advantage of the unique resource available to these students: their classroom teachers. Viewing the classroom teacher and the on-screen instructor as a teaching team opens the way to the kind of synergy which characterizes teams of teachers who work

together in physical proximity; we may well find that the distance/on-site teaching partnership works as a whole greater than the sum of its parts.

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